aneurysms. Application of the chimney technique using the Nellix device may offer some advantages with respect to seal between the endograft and chimney grafts. This study aimed to investigate the feasibility and efficacy of the Nellix Endovascular Aneurysm Sealing (EVAS) system in conjunction with chimney grafts.

A prospective evaluation of patients treated for juxtarenal and suprarenal non-ruptured aortic aneurysms using the Nellix system and chimney grafts was undertaken in a single Vascular Unit in the United Kingdom.

Between February 2013 and April 2015 28 patients were treated with EVAS in a chimney graft configuration. Mean age was 74 years (±8 years) and mean aneurysm size 67 mm (±10 mm). Eight patients underwent suprarenal aneurysm repair including a chimney graft in the superior mesenteric artery. Five patients had a double chimney configuration; all the other patients were treated with a single chimney configuration. There was one 30-day or in-hospital mortality (3.6%) due to Multi-Organ Failure (MOF) after repair of a symptomatic aneurysm; three other patients died within one year, due to pancreatic cancer (diagnosed after surgery), pneumonia, and sepsis respectively. One patient experienced a transient ischemic attack (TIA), followed by a full recovery and two patients suffered from a minor stroke (7%). No patient required postoperative renal replacement therapy.

The chimney technique, in combination with endovascular aneurysm sealing, appears to offer an effective solution for juxtarenal and suprarenal aneurysms with adverse morphology in the short-term.

The Role of 3D Fusion Computed Tomography in the Enhancement of the Safety Profile of FEVAR

A. Rolls [1], S. Rosen [1], M. Desai [1], D. Stoyanov [2], J. Constantinou [1], M. Davis [1], J. Cole [3], G. Hamilton [1], T. Mastracci [1]

[1] *Aortic Team, Royal Free Foundation Trust, London, UK*
[2] *Centre for Medical Image Computing and Department of Computer Science, University College London, UK*
[3] *Radiation Physics, Royal Free Foundation Trust, London, UK*

Three-dimensional (3D) fusion computed tomography (CT) is a new technology that may reduce radiation in FEVAR (fenestrated endovascular aneurysm repair). The aim of this study was to evaluate the radiation dose effect of introducing fusion imaging to an expert team.

Procedural details were gathered prospectively 18 consecutive patients receiving fusion-guided (Fusion Group) FEVAR and compared with 21 patients treated in the 12 months prior to the implementation of routine fusion imaging (Standard Group). Procedure time (PT), radiation dose, dose-area product (DAP), fluoroscopy time (FT), estimated blood loss (EBL) and pre- and post-operative estimated glomerular filtration rate (eGFR) were compared between groups.

The Fusion group (n = 18) received three 2 vessel-, ten 3 vessel-, four 4 vessel-, and one single vessel-fenestrated graft(s). The Standard group (n = 21) received five 4 vessel-, eleven 3 vessel-, four 2 vessel-, and one single-vessel graft(s). There was a significant reduction in PT for the Fusion group (median 285 mins; interquartile range 265–323) compared with the Standard group (420 mins; IQR 330–310 p = <0.001). There were significant reductions in radiation skin dose for the Fusion group (1.65 Gy; 1.22–2.22) compared with the Standard group (4.39 Gy; 3.28–7.05 p = <0.001), and DAP; Fusion (173.64 Gy cm^2; 138.33–232.77) vs (264.93 Gy cm^2; 173.37–366.85) for Standard (p = 0.001). EBL was reduced for Fusion (350 mls; 250–560) compared with Standard (1000 mls; 420–2300 p = 0.01). There was no difference in FT.

Implementation of fusion imaging significantly reduces radiation dose and other performance measures, and improves the overall safety profile of FEVAR.

Endovascular Aneurysm Sealing for Infrarenal Abdominal Aortic Aneurysms: 30-Day Outcomes of 105 Patients in a Single Centre

J.R.W. Brownrigg, J. de Bruin, A. Karthikesalingam, B. Patterson, P.J. Holt, R.J. Hinchliffe, R. Morgan, I.M. Loftus, M.M. Thompson

St George's Vascular Institute, St George's Hospital, London, UK

Endovascular aneurysm sealing (EVAS) is a potential alternative to endovascular aneurysm repair (EVAR) in patients with infrarenal abdominal aortic aneurysms (AAA). The early clinical experience, technical refinements, and learning curve of EVAS in the treatment of AAA at a single institution are presented.

105 patients were treated with EVAS between March 2013 and November 2014. Prospective data were recorded on consecutive patients receiving EVAS, including demographics aneurysm morphology, and 30-day outcomes, including rates of endoleak, limb occlusion, reintervention, and death. Postoperative imaging consisted of duplex ultrasound and computed tomographic angiography.

Mean age was 76 ± 8 years and 12% were female. Adverse neck morphology was present in 72 (69%) patients, including aneurysm neck length <10 mm (20%), neck diameter >32 mm (18%), β-angulation >60° (21%), and conical aneurysm neck (51%). One death and four Type 1 endoleaks (4%) occurred within 30 days. All four proximal endoleaks were associated with technical issues that resulted in procedure refinement, and all were in patients with adverse proximal aortic necks. Following treatment with transcatheter embolization, the persistent Type 1 endoleak rate at 30 days was 0%. There were no Type 2 or Type 3 endoleaks. Angioplasty and adjunctive stenting were performed for postoperative limb stenosis in three patients (3%).

EVAS is associated with reasonable 30-day outcomes, with applicability to patients with challenging aortic morphology. Endoleak rates should reduce with procedural experience. The utility of EVAS will be defined its durability in long-term follow-up, although the absence of Type 2 endoleaks is encouraging.

A 19-year Experience of Secondary Interventions Following EVAR

A. Burdess, M.J. Clarke, M.G. Wyatt

The Freeman Hospital, Newcastle, UK

EVAR is increasingly used as the primary mode of treatment for aneurysmal disease. However, this technique is associated with complications that mandate life-long follow up. We present a 19-year single-centre experience with EVAR, specifically examining the indications for re-intervention and the methods used.

A retrospective analysis was conducted of all EVAR cases performed at the Freeman Hospital from 1995–2014.

In a 19-year period 1100 standard EVARs were performed (947 abdominal; 161 thoracic). There were a total of 303 re-interventions in 212 patients (19%). Indications for re-intervention included: Endoleak (n = 180; 16%); sac expansion without endoleak (n = 38; 14%); limb occlusion (n = 40; 0.03%); disease progression (n = 28; 0.03%) and rupture (n = 10; 0.9%).

There were 214 endovascular interventions (71%) for endoleak and disease progression. 89 open interventions were required (29%). Almost half of open interventions were for limb ischaemia or groin complications. Open conversion was required for the majority of ruptures (n = 8/10) and continued sac expansion without endoleak (n = 33). The mortality associated with open conversion was 10%.

This series represents one of the largest in the literature and has a re-intervention rate of 19%, in line with previous reports. Although re-intervention is common, most complications can be successfully treated with endovascular techniques. However, if open abdominal intervention is required, there is a high mortality and the authors therefore propose a 'stent conserving' approach to open intervention.

Repair of Thoraco-abdominal and Peri-renal Aneurysms with the Multi-layer Flow-modulating Stent: The UK Pilot Study

C. Lowe [1,2], A. Worthington [1], F. Serracino-Inglott [3], R. Ashleigh [2], C. McCollum [1]

[1] *Institute of Cardiovascular Sciences, University of Manchester, UK*
[2] *Department of Vascular and Endovascular Surgery, University Hospital South Manchester, UK*
[3] *Department of Vascular and Endovascular Surgery, Manchester Royal Infirmary, UK*

The multi-layer flow modulating stent (MFMS) is a novel approach for the treatment of complex aortic aneurysms. We report outcomes in a UK pilot study of treatment of aortic arch, thoraco-abdominal (TAAA) and perirenal aneurysms (PAA).

With MHRA Devices Agency and ethical approval, patients who were unfit for open surgery and had no option for complex endovascular repair were recruited. Follow-up included CTA at one, three, six and 12 months, then annually for three years. Outcome measures included 30 day mortality, rupture, branch vessel patency, complications, re-intervention and maximal aortic diameter.

Fourteen patients (6 PAA, 6 TAAA, 2 arch) were treated between October 2011 and March 2014; mean follow up is 19.4 months. Seven patients (50%) have died including one fatal rupture. 30 day mortality was 7.14%. 12 month survival was 78.6%. In those alive at 12 months, four remained stable while aneurysm size had increased by >5 mm in seven. To date, three of the seven surviving patients have remained stable on the most recent available imaging. 50 of 51 covered aortic branches remained patent with no embolic stroke or visceral ischaemia. Six re-interventions were performed in five patients (35%). There was one post re-intervention death.

The early MFMS devices have had little influence on the natural history of complex aortic aneurysms. Side branch patency was maintained but these MFMS frequently dislocated. Further development is needed if this novel technology is to have a role in treating aortic aneurysm.

Preoperative Morphological Factors of Thoracic Aortic Aneurysm Sac Enlargement after Endovascular Repair

J. Sobocinski [1,2], B.O. Patterson [2], P.J. Holt [2], M.M. Thompson [2]

[1] *Aortic Centre, Vascular Surgery, Hopital Cardiologique, CHRU Lille, University of Lille, France*
[2] *St George's Vascular Institute NHS Trust, University of London, London, UK*

The effect of thoracic endovascular aortic repair (TEVR) on the aneurysm sac remains undefined. The aim of this study was to characterize the incidence of aneurysm sac expansion rate after TEVR and the effect of aortic morphology on sac behaviour.

A database of patients with pre and post-operative computed tomography angiogram (CTA) was provided by M2S, Inc. (2004 to 2013). All patients underwent TEVR for thoracic aortic aneurysms. Preoperative aortic anatomy including diameters, lengths and angulations were available for each patient. Post-TEVR sac expansion was defined as a >5 mm increase between the pre-operative and follow up CTA. The influence of pertinent aortic morphology on sac expansion was assessed using Kaplan-Meier analysis.

Of 899 patients undergoing TEVR, 46% had a maximum aneurysm diameter above the 55-mm threshold. The 5-year freedom from sac expansion was 61%. Several preoperative morphological factors were found to be associated with significant sac expansion after TEVR. The length of the proximal sealing zone <20 mm ($p = 0.020$), distal sealing zone <30 mm ($p = 0.008$), proximal and distal neck diameters over 38 mm (both, $p < 0.001$), distal aortic arch angle <60° ($p = 0.049$) and a maximal preoperative sac diameter >50 mm ($p = 0.003$) were more likely to be associated with sac expansion after 5 years.

This observational study demonstrated that post-TEVR aneurysm sac expansion is higher than expected, and this appears to be significantly influenced by several preoperative morphological factors. Meticulous preoperative patient selection and procedural planning is required to ensure favourable long-term results.